CLAIMS

What is claimed is:

1. An optical add/drop multiplexor comprising:

an optical add/drop module configured to (1) receive a multi-wavelength optical input signal from an input path, (2) provide a multi-wavelength optical output signal to an output path, and (3) provide dropped traffic comprising at least one dropped wavelength to a first drop path, the dropped traffic being removed from the multi-wavelength optical input signal; and

an optical signal de-interleaver coupled between the first drop path and a second drop path, the optical signal de-interleaver being configured to (1) receive the dropped traffic from the first drop path, (2) separate at least one selected dropped wavelength from the dropped traffic, and (3) provide the selected dropped wavelength to the second drop path for subsequent processing.

2. The optical add/drop multiplexor of claim 1, wherein the optical signal de-interleaver has an architecture comprising a plurality of hierarchical levels, at least one optical signal de-interleaver module being disposed in each of the hierarchical levels.

3. The optical add/drop multiplexor of claim 2, wherein the at least one optical signal de-interleaver module disposed in each of the hierarchical levels includes a single input port configured to receive an optical signal comprising at least one dropped wavelength, and a

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plurality of output ports configured to provide respective groups of dropped wavelengths.

4. The optical add/drop multiplexor of claim 2, wherein the at least one optical signal de-interleaver module disposed in each of the hierarchical levels includes a single input port configured to receive an optical signal comprising at least one dropped wavelength, and two output ports configured to provide respective groups of dropped wavelengths including a group of even wavelengths and a group of odd wavelengths.

5. The optical add/drop multiplexor of claim 1, wherein the input path, the output path, the first drop path, and the second drop path each comprise a respective single mode optical transmission fiber.

6. The optical add/drop multiplexor of claim 1 further including a tunable optical filter coupled to the optical signal de-interleaver by way of the second drop path, the tunable optical filter being configured to de-multiplex the selected dropped wavelength provided to the second drop path by the optical signal de-interleaver.

7. An optical add/drop multiplexor comprising:

an optical add/drop module configured to (1) receive a multi-wavelength optical input signal from an input path, (2) provide a multi-wavelength optical output signal to an output path, and (3) receive add traffic including at least one selected add wavelength from a

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first add path, the add traffic to be inserted into the multi-wavelength optical input signal; and

an optical signal interleaver coupled between the first add path and a second add path and configured to (1) receive the at least one selected add wavelength from the respective second add path, (2) in the event the at least one selected add wavelength comprises a plurality of selected add wavelengths, combine the plurality of selected add wavelengths to generate the add traffic, and (3) provide the add traffic to the optical add/drop module by way of the first add path for subsequent processing.

8. The optical add/drop multiplexor of claim 7, wherein the optical signal interleaver has an architecture comprising a plurality of hierarchical levels, at least one optical signal interleaver module being disposed in each of the hierarchical levels.

9. The optical add/drop multiplexor of claim 8, wherein the at least one optical signal interleaver module disposed in each of the hierarchical levels includes a plurality of input ports configured to receive respective groups of add wavelengths, and a single output port configured to provide an optical signal comprising the received add wavelengths.

10. The optical add/drop multiplexor of claim 8, wherein the at least one optical signal interleaver module disposed in each of the hierarchical levels includes two

input ports configured to receive respective groups of add wavelengths including a group of even wavelengths and a group of odd wavelengths, and a single output port configured to provide an optical signal comprising the even and odd wavelengths.

11. The optical add/drop multiplexor of claim 7, wherein the input path, the output path, the first add path, and the second add path each comprise a respective single mode optical transmission fiber.

12. The optical add/drop multiplexor of claim 7 further including a tunable laser coupled to the optical signal interleaver via the second add path, the tunable laser being configured to provide the at least one selected add wavelength to the optical signal interleaver via the second add path.

13. A method of receiving at least one selected dropped wavelength in a wavelength division multiplexed optical communications system, comprising the steps of:

receiving a multi-wavelength optical input signal from an input path by an optical add/drop device;

providing dropped traffic comprising at least one dropped wavelength to a first drop path by the optical add/drop device, the dropped traffic being removed from the multi-wavelength optical input signal;

receiving the dropped traffic from the first drop path by an optical signal de-interleaver device;

separating the at least one selected dropped wavelength from the dropped traffic by the optical signal de-interleaver device; and

providing the selected dropped wavelength to a second drop path by the optical signal de-interleaver device for subsequent processing.

14. The method of claim 13, wherein the separating step includes, in the event the at least one selected dropped wavelength comprises a plurality of selected dropped wavelengths, separating the plurality of selected dropped wavelengths from the dropped traffic by the optical signal de-interleaver device to generate a group of even wavelengths and a group of odd wavelengths, and wherein the second providing step includes providing the respective groups of even and odd wavelengths to the second drop path by the optical signal de-interleaver device for subsequent processing.

15. A method of providing at least one selected add wavelength to be inserted into a multi-wavelength optical signal in a wavelength division multiplexed optical communications system, comprising the steps of:

receiving the at least one selected add wavelength from a first add path by an optical signal interleaver device;

in the event the at least one selected add wavelength comprises a plurality of selected add wavelengths, combining the plurality of selected add

wavelengths to generate add traffic by the optical signal interleaver device; and

providing the add traffic to an optical add/drop device via a second add path by the optical signal interleaver device for subsequent insertion into the multi-wavelength optical signal.

16. The method of claim 15 wherein the receiving step includes receiving respective groups of selected add wavelengths including a group of even wavelengths and a group of odd wavelengths from the first add path by the optical signal interleaver device, and wherein the combining step includes combining the respective groups of even and odd wavelengths to generate the add traffic by the optical signal interleaver device.

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